

# Revisiting multi-level governance theory: Politics and innovation in the urban climate transition in Rizhao, China

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## ABSTRACT

Multi-level governance (MLG) theory has become the main explanation for how climate action is realized in poly-centric, multi-sector, multi-actor policy landscapes. In this paper, we examine processes of climate change governance in a given city in China, Rizhao, and evaluate how MLG arrangements operate. We do so by examining primary data collected through in-depth interviews with local stakeholders. Our results show that the focus on multi-level – and in particular transnational – interactions obscures the ways in which urban low carbon transitions happen in three ways. First, in spite of Rizhao being a well-known case in environmental politics, there is an absence of international actors and non-governmental organizations operating on the ground. Second, the emphasis on opportunities of local authorities to build political agendas through participation in global networks conceals how structures of power, political-economic coalitions, and technological practices are firmly fixed in a local context. Third, the case study illustrates the enduring authority of formal top-down channels of control in this political system. Based on these results, we caution against the uncritical application of MLG theory to environmental politics in settings where deliberative democracy is lacking and the full benefits of multi-level interactions are unlikely to be achieved.

## 1. Introduction

Multi-level governance has become a mainstream theory used to explain and interpret climate change politics. In recent years, we have witnessed scholars driving debates away from a focus on national governments, towards increasing recognition of the role played by non-state actors in formulation and implementation of climate objectives (Hoffmann, 2011; Okereke, Bulkeley, & Schroeder, 2009). This recognition is enshrined in international climate policy debates through the emphasis on sub-national action and international networks as alternative means of realizing climate change mitigation and adaptation (Andonova, 2009; Bulkeley et al., 2014a; Lee and Koski, 2015).

The concept of multi-level governance (MLG) refers to mechanisms of steering involving increasing connectivity between putatively separated spheres of governance. MLG recognizes the influence of government institutions operating at different scales, as well as diversification of actors from the private sector and civil society intervening in public issues. Ideas of MLG have a strong bearing on the way in which climate change action is promoted and advanced in practice. For example, the

commitment to tackling fragmented and complex policy issues through collaboration between national governments and non-state actors is reproduced through global agendas, such as the Sustainable Development Goals. SDG17 (“Revitalize the global partnership for sustainable development”) represents an affirmation of partnerships as a central strategy to implement sustainability action through collaboration across the traditional public-private divide. Similarly, the proliferation of transnational climate networks and their contribution to setting agendas and diffusing best practices, tools, and knowledge (FCM, 2018) illustrates the continued relevance of multiple interactions across geographical and administrative borders in the implementation of local climate solutions.

Having been enthusiastic proponents of the MLG perspective, we have seen ourselves revisiting this position during recent years. While the principles of MLG remain widely applicable to explain contemporary trends in climate change governance, we find that they also obscure the ways in which urban low carbon transitions happen. One area of concern is the emphasis on global interconnectedness, which situates cities in international networks. This is an inheritance from global city and world city theories, but is inadequate to understand

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contemporary challenges in most ordinary urban regions. Global city perspectives draw attention to the potential of urban areas to participate in the global economy, access international flows of technology, and attract multinational corporations (Taylor, 2004). Critics of these theories have long observed how cities in the global South are permanently excluded from such ‘urban’ studies, due to their comparatively limited ability to retain global capital and their ‘lower’ standing in the hierarchy of global economic power (Robinson, 2013). Similarly, small and average-sized cities are rendered invisible through theoretical debates that centre on globalization and economic hierarchies (Bell & Jayne, 2009). The MLG perspective reproduces some of these limitations by conceptualizing action in cities as extensions of transnational models of global governance.

Further, the focus on global coordination and orchestration (e.g. Bäckstrand & Kuyper, 2017) underplays the situated conditions of climate action, particularly in terms of the intimate interconnections between climate politics and urban political economies. MLG theory draws attention to the ability of municipal authorities to access information and resources and engage in policy processes that unfold beyond the territorial bounds of the city (Betsill & Bulkeley, 2004; Bulkeley & Betsill, 2005). Such conceptualizations have stimulated exciting new directions of theoretical development related to new forms of spatial hierarchies that extend beyond the dichotomy of national or international levels and the possibility for actors in cities to “jump” across administrative levels (Bulkeley, 2005). The realization that policy discourses are constructed through international and transnational interactions has significantly advanced our understanding of the complex dynamics of global climate governance (McDonald, 2013; Toly, 2008). Yet, the emphasis on opportunities of local authorities to build political agendas through participation in global networks conceals the crucial role of structures of power, economic interests, and political-economic coalitions that are firmly fixed in a local context. The MLG approach can thereby obscure how urban climate politics are constructed through negotiations of political-economic interests dominated by local elites (Khan, 2013; Roy & Ong, 2011).

The MLG approach is by no means the sole theoretical lens employed to study and explain climate politics and action. The urgent nature of the climate change challenge has been a productive inspiration for theoretical development within a variety of disciplines. Alternative accounts of climate governance are, for example, informed by political economy perspectives and neo-Gramscian theory (Levy & Egan, 2003), Foucauldian analyses of governmentality (Löwbrand & Strippel, 2013; Rutland & Aylett, 2008), political ecology approaches that reveal links between power and material flows (Rice, 2014), and discourse analyses (Bäckstrand & Löwbrand, 2006; Stevenson & Dryzek, 2012). Nevertheless, many of these analyses intersect with the concerns of MLG and reflect the increasing interest in the interconnectivity between multiple actors and institutions of climate governance.

Moreover, MLG is gaining ground in contexts where its application would have been unlikely only a few years ago. In China's semi-authoritarian political system, where ideological control and a single-party political system co-exists with economic freedom, theories of multi-level and network governance have helped to characterize a landscape of multiple authority-building practices (Francesch-Huidobro & Mai, 2012; Mai & Francesch-Huidobro, 2015). In practice, the MLG approach represents an alluring alternative to China's traditional, state-centric, top-down style of environmental management (de Prado, 2007; Liu, Zhang, & Bi, 2012; Yang, 2005). Efforts to describe China's environmental governance landscape through frameworks that hold a paradigmatic position in contemporary governance research will continue to intensify. The result is that governance theories initially developed to explain policy interactions in liberal democracies are increasingly becoming attached to political developments in China, especially as the development of a modern environmental state is hypothesized to result in institutions increasingly similar to those in the ‘West’ (Mol & Carter, 2006, 2013).

By contrast, we argue that the caveats needed to understand MLG in China are so large that they overwhelm the concept's usefulness in explaining contemporary dynamics of environmental policy practices. During the last five years, we have focused on sustainability transitions taking place in a specific city in China, Rizhao. Our analysis focused particularly on MLG arrangements that enable the delivery of low carbon innovation and its diffusion through the urban area (Huang, Castán Broto, Liu, & Ma, 2018) alongside the climate change imaginaries that inform local politics (Westman & Castán Broto, 2018). The integration of both approaches shook our convictions about MLG. In particular, our analysis exposed the intimate connections between climate mitigation agendas and the political economy of the city, where economic interests and power dynamics, rather than coordination, play a central role in sustainability transitions. Horizontal interplay between non-state actors is reduced to political-economic coalitions, while climate mitigation dynamics are shackled by local fossil-fuel dependent interests. Further, the vertical interactions that unfold in climate politics in China are constrained by formal structures of government; political mandates continue to travel from higher to lower administrative offices in a traditional top-down manner. There is a marked absence of transnational networks and global interconnectedness, which has led us to critically question the application of MLG theory to climate governance dynamics in this setting. The case of China points towards the limitations of MLG frameworks to explain the multiple ways in which climate change is governed.

Our investigation of urban climate governance in Rizhao is structured as follows. The paper is framed in relation to the theoretical development of multi-level governance theory and its conceptualization in research on responses to climate change (Section 2). We present the methodology of this study in Section 3. Section 4 explains the interactions and processes involved in the politics of eco-city construction and renewable energy technology innovation in Rizhao. Finally, in Section 5 we reflect on the usefulness of the MLG lens to explain mechanisms of governing urban low carbon transitions.

## 2. Multi-level governance and the heterogeneous processes of climate change governance

To capture the central position of the MLG perspective in research on climate change governance, this section provides an overview of the literature on MLG and its application to climate governance in particular. After outlining the origins of these ideas (Section 2.1), we discuss current climate governance debates (Section 2.2). We conclude this overview by considering emerging limitations associated with the MLG approach, which inform the analysis of this study (Section 2.3).

### 2.1. Governance and multi-level governance

The conceptual history of governance can be traced back to the 1940s and ensuing decades, at which time economic and social organizations such as corporations, unions, and universities increased in complexity and required new forms of management and decision-making processes (Căjvănăneanu, 2011). The concept gradually transferred into other societal spheres. Towards the 1980s it gained influence as a result of at least three development processes: the development of cybernetics and systems theory; the rise of neo-liberal ideology and introduction of neo-institutional economic theories on transaction costs; and increasing concerns regarding the limited ability of national governments to independently formulate and implement public policy (Căjvănăneanu, 2011). This perceived inability materialized in a context of globalization, privatization, diffusion of authority to supra-national and sub-national authorities, the diminishing role of the welfare state, and an increasingly visible role of private actors and civil society in public affairs (Pierre & Peters, 2000).

Fundamental reinterpretations of the nature of state power evolved in this context. Accordingly, conceptualizations of societal steering shifted from a focus of government institutions towards a general

objective to coordinate social systems and facilitating public institutions' collaboration with private sector actors, civil society, and transnational organizations (Pierre, p.3, 2000). Research on collective action on a global level revealed how informal authority and emergent systems of rule characterize interactions in a globalized, interconnected world (Rosenau, 1995). The concept of governance was deployed to reflect these new processes of steering and production of conditions of ordered rule (Rhodes, 1996).

Through processes of governance, non-state actors contribute to the formulation and realization of public goals. Policy making involves interaction between heterogeneous sets of actors, negotiation of interests, and contestation over language and discourse. Governance is thus understood, in the words of Torfing et al. (2012, p. 14), as “the complex process through which a plurality of social and political actors with diverging interests interact in order to formulate, promote and realize common objectives”.

Notions of MLG emerged to describe fragmented, multi-actor, collaborative, and polycentric arrangements to govern environments and territories in Europe around the 1990s. MLG can be understood as a specific form of networked governance arrangement that consists of two related sets of processes (Hooghe & Marks, 2001). The first is the negotiation of authority and competencies between different levels of government, such as municipal and central government authorities. The second consists of interconnected spheres of authority across multiple scales and jurisdictions, involving participation of a variety of state and non-state actors (Hooghe & Marks, 2001). Climate change governance involves both types, as explained below.

## 2.2. Multi-level governance and climate action

MLG arrangements are pervasive in climate mitigation and adaptation responses at a global, national, and urban level. At a global level, formal negotiation between nation states remain an important mechanism to solve international challenges, yet climate action is often realized by working through informal channels (Hoffmann, 2011). In relation to the diffusion of authority across national administrative boundaries, transnational governance constitutes a specific form of multilevel governance that occurs on the international arena. Transnational climate governance networks are made up of diverse and heterogeneous actor constellations that range from formal cooperation projects to loosely arranged dialogues, brought together by a common purpose to respond to the climate change challenge (Bulkeley et al., 2014a). These networks fulfil a range of important global governance functions, such as dissemination of information, rule setting, introduction of standards, and capacity building (Bulkeley et al., 2012). The enrolment of “new” actors and new sources of authority in global governance arrangements has prompted reconsideration of the structure and functions of global regimes (Okereke et al., 2009). Governance of the climate on a global level can be understood in terms of a “regime complex” made up of autonomous spheres of authority and multiple un-coordinated measures directed towards a common goal (Bulkeley & Newell, 2015, p. 13).

In the context of national climate change governance, there is growing recognition that responsibility for action needs to be shared between government levels and sectors, as well as across the traditional public-private divide. While climate change issues often fall under the jurisdiction of environmental departments, authorities in charge of economic and industrial issues, as well as transport, construction, and food, tend to have a major influence over emission activities. Network connections across government sectors and levels is usually required to facilitate intra-governmental collaboration, coordination, and resource mobilization (Bai et al., 2009; Leck & Simon, 2013). Further, greenhouse emission activities are deeply embedded in consumption and production activities that depend on the private sector. Climate governance therefore involves engaging private actors in leadership and policy implementation, which calls for hybrid governance arrangements and new divisions of roles and responsibilities (Bulkeley & Newell, 2015).

Before the materialization of climate debates, cities and local authorities had already demonstrated strong leadership in sustainability agendas (Bulkeley & Betsill, 2003; Bulkeley et al., 2011; Gupta, Van Der Leeuw, & de Moel, 2007; UNDS, 1992). In the context of urban climate action, successful modes of urban governance depend on mobilizing networks alongside concrete moments of individual leadership (Kern & Bulkeley, 2009). One expression of this is strategies of local authorities to access information and resources through international policy processes (Betsill & Bulkeley, 2004; Bulkeley & Betsill, 2005). This includes vertical, intragovernmental interactions and coalitions that stretch across scales, as well as struggles to define competencies and discursive aspects that define urban challenges (Bulkeley & Betsill, 2005).

The multiform possibilities of climate change governance calls for attention to various kinds of actor interactions (Betsill & Bulkeley, 2004; Bulkeley & Betsill 2005, 2013). Partnerships and relation-building between government levels (Holgate, 2007), horizontal collaboration between government departments (Collier & Lofstedt, 1997), and coordination with international or supranational institutions (Monni & Raes, 2008) are strategies to overcome institutional barriers and conflicts. Climate initiatives realized through hybrid actor constellations may contribute to experimentation with new ideas and solutions, resulting in social and technical innovation (Bulkeley & Castán Broto, 2012). Consolidation of a multiplicity of interests and innovative forms of engagement with publics and communities can help create legitimate policy objectives (Cashmore & Wejs, 2014). Engagement with communities may also disrupt static notions of partnerships (Castán Broto, Domingos, Boyd, & et al, 2015; Chu, Anguelovski, & Carmin, 2016) and unearth alternative logics of low carbon action (Aiken, 2016). MLG is seen as central not only to broadening participation, but also to integrate dimensions of justice into climate change planning processes (Shi et al., 2016).

Although MLG theory emerged through observations of new political realities created through evolving policy landscapes (primarily) in Europe, the concept has diffused throughout a variety of geographical and political contexts. The concept has been applied to understand climate governance dynamics in North America (Betsill & Rabe, 2009; Rabe, 2007), South America (Romero Lankao, 2015), Asia (Franceschi-Huidobro, 2016; Schreurs, 2010), and Africa (Leck & Simon, 2013). Furthermore, the approach has gained normative currency through its association with governance strategies that represent more fluid and inclusive alternatives than traditional top-down models (Castán Broto, 2017). The widespread recognition of the need to mobilize actors from multiple sectors is associated with calls for deliberative and collaborative policy approaches. Collaborative planning can function as a means to share responsibility, catalyze action at the appropriate governance level, and enrol local knowledge and a multiplicity of interests (Carter et al., 2015). Thus, MLG processes grounded in collaborative policy strategies can promote institutional arrangements that shift the boundaries between society and publics vis-a-vis knowledge production and science (Corburn, 2009; Corfee-Morlot et al., 2011).

## 2.3. Limitations of the multi-level governance approach

In an appraisal of two decades of research on climate change governance, Bulkeley and Betsill (2013) re-examined the usefulness of the MLG approach for climate politics. They concluded that attention to network interactions continued to be relevant in explaining relationships between actors, negotiation of resources, and mobilization of norms and ideas. Yet, they argue that there was a persistent need for further attention to the material dimensions of climate change governance emerging from urban economies and socio-technical networks (Bulkeley & Betsill, 2013; see also; Bulkeley, 2010).

While the focus on vertical and horizontal interplay between actors reveals the heterogeneity of voices and interests involved in climate politics, MLG studies may actually obscure power dynamics at work. In most MLG research on climate change, the inclusion of a multiplicity of

voices is implicitly assumed to be equivalent with inclusion, participation, collaboration, and enhanced legitimacy. By contrast, recognition of the role of (often economic) stakeholders in governance processes may instead be associated with barriers to change, policy capture, vested interests, and other concerns in policy studies.

Networked governance arrangements shift decision making authority from democratic institutions and elected politicians to non-public actors, raising questions of equity, representation, accountability, and legitimacy (Sorensen, 2002). For example, an evaluation of transnational climate networks revealed that these partnerships allow for increased business influence, power inequalities, and skewed representation of stakeholders, as well as tendencies towards elitist and technocratic domination (Bäckstrand, 2008). A critical political economy perspective suggests that key economic stakeholders influence political elites in environmental decision-making processes at a global and national level (Levy & Newell, 2005). Tensions associated with commercial and investment interests and local economic development priorities are especially likely (Baker & Sovacool, 2017). In urban climate politics, political-economic elites often control decision making processes and may obstruct low carbon paths of growth by protecting current high carbon trajectories (Khan, 2013).

We agree with Tanner and Allouche (2011) that the political economy perspective needs to be granted a central position in studies of climate politics, with the proviso that such perspectives pay attention to dynamics of change and how these affect people's lives. Currently, MLG lenses that emphasize the distribution of authority across scales and borders fail to accurately capture the concentration of power in political and economic elites. Urban elites may not only pose barriers to change but may also advance climate change action as a strategy for power reproduction. While MLG is a productive perspective to identify multiple locations of innovation, it must be tempered with a sober assessment of how power over resources and interventions is deployed beyond the institutional arrangements that govern climate change. Moreover, MLG directs attention away from the contingency of socio-material relations that shape transition possibilities, as the overarching focus on interactions, relations, and collaboration in networks creates the impression that practices and solutions are transferable across scales and between contexts. In the case study of this paper, we set out to explain how MLG dynamics may be interpreted differently through perspectives that recognize urban political economies and local settings. MLG theory opens up the institutional question in climate change governance, but in the context of urban transitions in China, this theory conceals the complexities of climate politics and its material expression in the urban fabric.

### 3. Methodology

Our analysis focuses on a Chinese city, Rizhao, well-known and internationally recognized for its low carbon development achievements (ICLEI, 2012). The empirical material presented in this paper was collected through interviews performed in Rizhao during field studies in 2013 and 2016. The sections below present the methodology of the study, including rationale behind the case study selection and data collection method.

#### 3.1. Case study selection

Rizhao is situated on the East coast of Shandong Province, China's third largest province in terms of population and gross domestic product (see Fig. 1). The city functions as a national manufacturing and shipping hub, and large investments have been directed towards the manufacturing and real estate sectors in recent years (RMY, 2002–2010). These economic activities have had an adverse effect on the urban environment; the industrial sector causes air and water pollution and pressure on natural resources, while expansion of built-up land causes loss and fragmentation of natural habitats and biodiversity (Wang, 2009). In this regard, Rizhao is representative of environmental challenges in industrialized urban regions along China's East coast.

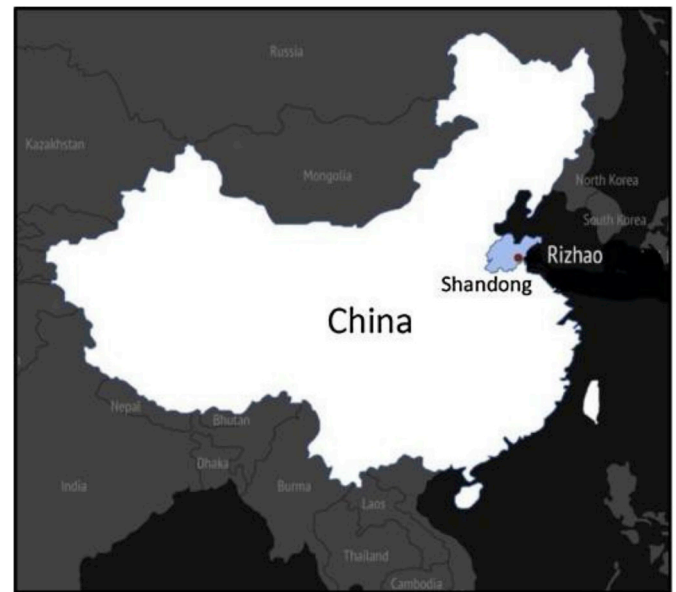


Fig. 1. Map indicating geographical location of Rizhao.

Rizhao, with a population of around three million and a GDP per capita of approximately 70,000 RMB (Rizhao Statistical Bureau, 2017), is a mid-size, medium-income urban area in China.<sup>1</sup> As is typical of cities in the region, Rizhao has experienced steady population growth and rapid GDP expansion since the 1990s, followed by decline of the agricultural sector and expansion of secondary and tertiary industries (Rizhao Municipal Statistical Yearbooks, 1978–2011). While various studies of low carbon development in China emphasize development in first-tier, internationalized cities (Baumler, Ijjasz-Vasquez, & Mehndiratta, 2012; Lo & Leung, 2000; Lo & Tang, 2006; Mai & Francesch-Huidobro, 2015), less attention has been paid to strategies used by ordinary cities confronting this type of issues. We address this gap by considering how an ordinary urban region with an average municipal budget attempts to embark on a low carbon development path.

In spite of its limited economic resources, Rizhao is seen as a success in environmental protection. In 2001, Rizhao adopted an Eco-City Construction Plan (2001–2020), which distinguished the city as a pioneer in environmental issues in China. Since 2001, Rizhao has received a number of awards for its environmental performance, including China's first World Clean Energy Award (WCEA) in policy and law-making in 2007 and the UN-HABITAT Scroll of Honor Award for green planning in 2009 (UN-HABITAT, 2009). The city has been recognized by international media (Biello, 2008, 2017) international institutions (WWF, 2012), and in previous research (Bai, 2007). The municipal government continues to express its commitment to a low-carbon development mission (RMPPG, 2017).

Some indicators suggest that MLG dynamics are especially likely to emerge in Rizhao. In its application for the UN-Habitat Scroll of Honor, the municipal government pointed to innovative governance arrangements, such as participatory planning and policy models (RMPPG, 2009). These participatory elements are recognized by ICLEI (2012). In terms of international networks, Rizhao joined the Climate Neutral Network in 2008, at which point the city was recognized as a “trailblazer” on route to zero emissions (UNEP, 2008). In the implementation of its eco-city building programme, Rizhao has received support from the EU-China Environmental Management Cooperation Program and funding from the World Bank (RMPPG, 2009). We therefore selected Rizhao on

<sup>1</sup> The national GDP per capita in China in 2016 was approximately 50,000 RMB (World Bank, 2017).



the principle of a case study likely to reflect MLG mechanisms in China's political system.

### 3.2. Data collection method and analysis

Two data collection periods were conducted for this study. The first set of semi-structured interviews were held between March and May in 2013. They included sixteen respondents from the public and private sector and academia. We spoke with individuals with insight into the city's energy saving and emission reduction policies, as well as decision-making processes related to the eco-city construction program (Westman & Castán Broto, 2018). This included municipal authorities, researchers at local universities, representatives of private companies, and researchers and planners who participated in drafting plans and policy in Rizhao but are based in institutions in Beijing. The second set of interviews were held in 2016 (Huang, Castán Broto, & Liu, 2018). In total, 27 stakeholders (including government officials, entrepreneurs, NGOs, and end-users) were interviewed. Key questions revolved around different perspectives on the expansion of solar energy in Rizhao, evolving governance approaches, as well as user experiences (Table 1).

All interviews for this study were conducted in Mandarin, transcribed, translated to English by the authors, and coded manually. Exploratory analysis examined the actors involved in climate action processes, sources of conflict, and forms of collaboration between actors. A further stage of analysis took place to identify all vertical interactions (across government levels) and horizontal collaborations (between departments or beyond the public domain) in local climate action, with specific attention to two contrasting examples of eco-city development and solar technology innovation.

### 3.3. Methodological limitations

Our methodological approach is associated with certain limitations, in particular with regards to generalizability. While our results suggest that it is unlikely for full MLG mechanisms to materialize in ordinary urban regions in China, there may be exemplary cases of progressive forerunners to which our conclusions do not apply. Our conclusions also do not aim to reflect governance dynamics in China's affluent and well-connected megacities, which may display a greater propensity towards participation and non-state actor inclusion. More broadly, insights into the political system in China are difficult to translate to other political contexts. We aim to identify empirical phenomena with a potential bearing on theoretical explanations of how climate politics and innovation unfold on the ground in relation to political economies and embedded technological practices.

## 4. Climate governance in Rizhao

As with other cities in China, energy conservation and environmental policy in Rizhao fall under the remit of authorities in different sectors. Thus, exploration of 'climate governance' requires consideration of interactions between eco-city strategies and sector-based policy approaches, such as renewable energy strategies. In the sections below, we focus particularly on the efforts to transform the city into an eco-city and a series of economic and political processes that led to the wide implementation of solar water heating systems. The case study of Rizhao exhibits an abundance of governance interactions which do not fit neatly the dynamics predicted by an MLG perspective. In particular, we identify a disconnect between the portrayal of Rizhao as an

international environmental forerunner and the realities of environmental policy on the ground.

### 4.1. Eco-city development and the urban political economy

Since the early 2000s, Rizhao's leaders have sought to create an enabling environment for the establishment of a nationally recognized eco-city. Yet, this plan is at odds with the current economic structure of the city. As observed by an urban planner:

*China has a saying: "Out of two bad things, choose the one which is less bad". We cannot please all the industries in the South area while also protecting the environment and developing the tourism industry (Planner, Beijing, 2013.04.19).*

Rizhao is trying to establish itself as a tourist destination. Central to its promotional strategy is a long stretch of white beach in the city centre – an attractive site partially developed into a water sports area. Unfortunately, the beach is located next to a major industrial zone. When the ocean winds blow inland, the city centre is suffocated by emissions that ruin the multi-sensorial efforts to create a beautiful holiday resort. Air pollution wraps the city in a grey haze, while water pollution contributes to blooming of algae along the coast line. As observed by a planner, "the entire ocean is green and if you go swimming, you will become green too" (Planner, Beijing, 2013.04.19). Shutting the factories, however, is not a feasible option as the urban economy depends on its industries as much as on its dreams of becoming a tourism hub. Below, we demonstrate how strategies to build an eco-city have been permeated by this dilemma.

#### 4.1.1. Horizontal interaction (intragovernmental)

In Rizhao, multiple opposing interests emerged in relation to the location of industrial units, water scarcity, and the protection of sensitive ecological areas. Officials within different municipal institutions disagreed about the nature and responses to these conflicts. For example, the priorities of the municipal Environmental Protection Bureau (EPB) and the Development and Reform Commission (DRC) were seldom aligned, as the former prioritizes ecological protection while the latter prioritizes economic expansion. A planner in charge of Rizhao's recent spatial plans observed that "different municipal authorities, such as the forest department, the agricultural department, the tourism bureau, and the DRC, tend to have different opinions for 'each piece of land'" (Planner, Beijing, 2013.03.22). Another planner described these divergences as follows:

*There were a lot of contradictions. For example, industrial departments wanted to develop the chemical industries, the power plant and the manufacturing industry in Rizhao. So, there were a lot of industries and we thought they were too heavy. The agricultural department wanted to expand their activity, but we thought that would not be simple because of the water shortages. The tourist department wanted to develop the area around a lake by the coast, but we thought that it was not ready for this (Planner, Beijing, 2013.05.17).*

While attempting to reconcile these tensions, the Mayor's Office has the strongest influence over planning decisions. A local researcher expressed that "if there are any contradictions between different units, the government is likely to spend more time researching the problem. They will try to find consensus and to consider as many ideas as possible, but in the end the plan is under the Mayor's Office" (Researcher, Rizhao, 2013.03.13). A planner described the situation as follows:

**Table 1**  
Summary of interview data.

Number of interviews	43 (16 + 27)			
Dates	2103.03–2013.05; 2106.10			
Respondents per sector	Academia: 7	Government: 9	Companies: 13	Intermediary: 4
				End-user: 10

*When [planning conflicts] arise, we will have a meeting and discuss the options. The planners will normally present a proposal and then the issue will be discussed until an agreement is reached ... Planning decisions should be based on the opinion of the majority of stakeholders involved, but the Mayor's Office has more influence over final decisions (Planner, Beijing, 2013.04.19).*

Yet, these contradictions were multiplied even within the highest level of leadership. Rizhao's eco-city strategies were originally suggested and promoted by a Mayor with a high level of education and international awareness. Personal interest and knowledge of this individual was instrumental to the early adoption of the eco-city building plan (Huang, Castán Broto, & Liu, 2018). Nevertheless, difficulties materialized in later years as the Mayor's Office formed alliances with major economic stakeholders, thereby creating barriers to further ecological protection (explained in section 4.1.3).

#### 4.1.2. Vertical interaction (intragovernmental)

The conflicts expressed by local authorities in Rizhao are reflected in higher levels of government. On the one hand, Rizhao remains under heavy pressure to strengthen and expand the local economy. The national cadre evaluation system, which guides decision-making of local political leaders, continues to place heavier emphasis on economic growth than on environmental protection (Wu, Deng, Huang, Morck, & Yeung, 2013). Further, Shandong Province has mandated strategic development of the port industries in Rizhao. As the port is of logistic and economic importance to the entire province, expansion is essential, as explained by a planner: “the port serves the entire region, so the development path had been decided on a higher level. The water way is a much cheaper transport than by land, so therefore it is needed, logistically, for the region” (Planner, Beijing, 2013.05.22).

On the other hand, eco-city construction is encouraged by China's central government, which provides praise and funding for eco-city projects. To complicate matters, Rizhao's tourism development strategy is mandated by Shandong Government. Few cities in the region have beaches, making the shoreline a regional asset (Official, Rizhao, 2013.05.13). Eco-city construction in Rizhao is also supported by Shandong EPB, which has provided expertise in formulation of Rizhao's second eco-city plan (Official, Rizhao, 2013.05.08). As a result, intragovernmental tensions are exacerbated rather than relieved by conflicting pressures exerted by higher level officials.

#### 4.1.3. Horizontal interaction (intergovernmental)

Economic stakeholders, in particular industry and real estate, play a determining role in decision making in Rizhao. A planner explained that the local government tries to reduce urban emissions, but this is difficult due to the influence of economic stakeholders (Planner, Beijing, 2013.04.19). A local researcher described their dominating position as follows:

*When they write the plan, they do consider the environment. For example, with water, they have to consider all areas of water use and resources: agricultural use, industry, and all sources of pollution. There should normally be research done in all these areas as a basis for the plan. But in my experience, this will be a process of ‘in the day-time we research, in the night-time we vote’. Because in the end, even if there may be pollution, the government still needs to consider GDP, economic growth, factories (Researcher, Rizhao, 2013.03.13).*

The same respondent pointed out that income from the steel factory has a significant impact on the local government's potential to pursue eco-city agendas. When the iron and steel market was hit by a financial downturn, the entire urban economy was affected, including the budget for low carbon development. When the steel factory is doing well, the municipal government has economic resources to do some “low carbon spending” (Planner, Beijing, 2013.04.19).

The strong influence of economic stakeholders is also associated

with the revenues generated through land development. One planner explained that in deliberations over whether to protect an area for tourism purposes, the larger income potentially generated by industrial activities led to a decision in favour of the latter option:

*[If] they begin to develop tourism projects in the inland, in an area in Wulian, this would allow for the tourist industry to spread from the coast and to the less developed inland. But instead, this area was developed for industrial development and used for industries related to the port industrial zone. The income from the industrial activities would be much bigger than that from tourism so it was hard to push this point. In the planning process ... it was the government's decision, but it might have been suggested by industrial interests (Planner, Beijing, 2013.04.19)*

According to two planners, urban development interests and profit generation ultimately determine which areas remain protected (Planner, Beijing, 2013.04.19; Planner, Beijing, 2013.03.22). The municipal planning department may sacrifice sensitive zones for the sake of economic interests:

*Whether or not [the ecologically sensitive areas] will be developed will be decided by the Municipal Planning Bureau. So, their position is very dangerous, ha-ha! ... They may say the GDP is very important, so we cannot keep the mountains. In the north, they already kept the mountains for a long time. But the industrial areas develop so fast, they are like a virus (Planner, Beijing, 2013.04.19).*

Alongside these clusters of political-economic authority, technical experts have influenced Rizhao's eco-city decisions. Experts from (semi-governmental) organizations like China Academy of Sciences (CAS) and China Academy of Urban Planning and Design (CAUPD) have participated in drafting the Rizhao Master Plan and Rizhao Eco-City Construction Plan. A high status is attributed to their ‘scientific’ advice, which sometimes lends greater consideration to ecological protection. For example, the conservation of Rizhao's coastline was originally suggested by the CAUPD while drafting Rizhao's 1993 Master Plan. While “a lot of people” wanted to develop this zone, the government didn't “fall for the pressure of the profit of individuals” (Official, Rizhao, 2013.05.13) and instead listened to the “expert advice” (Planner, Beijing, 2013.05.24).

Struggles between political-economic priorities and technical advice occupy the central stage of Rizhao's eco-city planning processes. In comparison, involvement of NGOs, communities or citizen participation plays a very limited role. The main strategy to address public opinion has been to elicit responses on existing planning drafts. Surveys, internet consultations, and informal questions to small numbers of citizens have been used, but the level of participation through these channels is low (Planner, Beijing, 2013.05.17; Planner, Beijing, 2013.04.19). Meetings are, in theory, arranged to invite groups that are opposed to planning suggestions, such as populations who live next to polluting factories. However, in practice these opinions will normally not be seriously considered:

*There are also people who do not want the factories, like the people who have to live right next to the factory. Maybe the government can deal with some pollution for the sake of the city development, but the people who live next to it don't want it. This is an inequality issue. The government will have a meeting to allow for opposing opinions, but often these voices will not be considered (Planner, Beijing, 2013.03.22).*

#### 4.1.4. Vertical interaction (intergovernmental)

To our surprise, our data collection in Rizhao did not reveal a presence of international organizations in the city's eco-city construction processes. Throughout our interviews, we systematically inquired about support from or collaboration with international or foreign organizations, but these probes yielded little results. The recreational area along the coast was designed by foreign firms (American EDSA Design and German TZ Design), but this involvement was limited to designing the

aesthetic layout of this area. While Rizhao is internationally recognized for its green planning efforts, this reputation does not translate into involvement of transnational networks or engagement with alternative discourses in local eco-city building efforts. The innovative approaches promoted in publicly available documents (ICLEI, 2012; RMPG, 2009) are not visible in political practices. International efforts appear instead to be reduced to brand-building activities that seek to attract investment rather than actually transform the city (Planner, Beijing, 2013.03.22). Parallels can be drawn here with well-known cities in other countries that have adopted sustainability agendas as a form of economic (re-)development strategy, and eventually gained international recognition for these efforts (c.f. Holgersen & Malm, 2015).

In conclusion, our empirical material shows little integration between different levels of government, little effective participation of international actors, and little coordination between the main actors involved in making Rizhao's eco-city. In contrast, there is a clear dominance of economic interests and linear narratives of growth, combined with approaches to public participation as mere consultation. And yet, Rizhao's low carbon development strategies seem to prosper, especially in sectors which depend on "environmental-friendly" industries and solar energy (see next section). To the extent that climate change action does take place it occurs in spite of the lack of MLG collaboration, and not because of it.

#### 4.2. The politics of innovation of solar-water technology

In Rizhao, the implementation of solar water heater (SWHs) systems in high-rise buildings is the most widely promoted example of low-carbon development. In this section, we focus on the innovation process of SWHs in the urban area, which we understand in a broad sense as the "development of technology in interaction with the system in which the technology is embedded" (Hekkert, Suurs, Negro, Kuhlmann, & Smits, 2007, p. 414). This involves research and development of solar technology, introduction of physical artefacts, and the parallel evolution of dimensions such as markets, institutions, and user behaviours. In Rizhao, two types of SWH technologies are prevalent – water-in-glass evacuated tube SWHs and wall-mounted flat plate SWHs. The popularization of these two technologies has followed different trajectories and catalyzed distinct governance interactions, as explained in detail below.

##### 4.2.1. Horizontal interaction (intragovernmental)

The popularization of wall-mounted flat plate SWHs in high-rise buildings in Rizhao is an achievement largely attributable to efforts of local authorities. In 2007, Rizhao Municipal Government enacted a mandatory installation regulation of SWHs in design and construction of newly-built low-rise and multi-store residential buildings. As the regulation pertained solely to the construction industry, this policy strategy did not require interaction across government departments and was enforced through stringent supervision of the municipal Construction Committee. The initial political intention of the regulation was to manage individually-installed (water-in-glass evacuated tube) SWHs. These were often fitted to buildings in an unregulated, messy fashion and were considered a risk to both the safety of residents and the general image of the built-environment (Huang, Castán Broto, & Liu, 2018). As explained by a government official:

*They [government officials] strongly agreed with the integration of SWH systems in buildings, so that SWH can be uniformly installed and neatly placed on the rooftops of buildings. You know rooftops are the fifth façade of buildings. From high-rise buildings, we can only see the rooftops of low-rise buildings. If all the SWHs are neatly arranged, it would be very easy on the eyes ... Moreover, the integration of SWH systems in buildings can also keep the damage on the rooftops to a minimum. To avoid the SWHs being blown away by the wind, they need to be fastened on the roof. Residents use different ways. Some put big rockets on it,*

*some use bricks, some use iron wire. These measures would do damage to the roof, especially the waterproofing. If we mandate and standardize the installation of SWHs, these problems can be solved (Official, Rizhao, 2016.10.17).*

An official in charge of this policy indicated that the design and installation requirement was an essential factor to secure widespread diffusion of SWHs in residential buildings (Official, Rizhao, 2013.03.15). The respondent attributed the successful implementation to "a unique construction management system," through which "design, planning, and construction are all handled by the same department. This gives more power to the sector and we can enforce it on our own" (Official, Rizhao, 2013.05.15).

##### 4.2.2. Vertical interaction (intragovernmental)

In the promotion of SWHs in Rizhao, the political calculations of the municipal government were in alignment with higher-level political priorities. In 2006, China's central government adopted a Renewable Energy Law to set the stage for nation-wide promotion of clean energy sources. In 2006, Shandong upgraded energy performance to a "veto" target (failure to meet targets can result in exclusion from promotions and dismissals), indicating the overall priority attached to energy policy in the region (Shandong Government, 2008). In a meeting in November 2009, the vice-governor of Shandong Province suggested making the integration of solar energy in buildings the salty port to the application of solar energy (Shandong Provincial Government, 2009). The provincial government aimed to increase the application rate of SWHs in urban areas from 20% to 40% within the coming three years (Shandong Provincial Government, 2010). After the meeting, Shandong Government enacted a document that detailed specific goals for implementation of SWH systems. An annual assignment was set for all cities in Shandong province to reach this goal (to double the application area from 12 million square meters in Shandong and 400,000 square meters in Rizhao in 2010, to 24 million square meters in Shandong and 1.5 million square meters in Rizhao in 2017) (Huang, Castán Broto, & Liu, 2018). All levels of government supported this direction of development, leading to concerted efforts to support widespread adoption of solar technology in the construction sector. However, these policies arrived to Rizhao after solar water heater use was consolidated in this urban area and already a dominant component of Rizhao's energy landscapes. The provincial strategy therefore had much less impact in other cities where the solar industry was not as developed.

##### 4.2.3. Horizontal interaction (intergovernmental)

The introduction of new technologies into the urban built environment necessitated new governance strategies in terms of horizontal collaboration, in particular with economic stakeholders. Especially, the mandatory requirement for installation of SWHs in high-rise buildings placed significant pressure on local developers. A response to this implementation deficit was the emergence of a new market segment for wall-mounted flat plate SWHs, namely the "construction project market". In this market segment, contracts are often directly signed between real estate developers and SWH manufacturers to install SWH products for the whole real estate project. These new relationships signal alignment between SWH industrial interests and political priorities. Eventually, a collaborative relationship developed between the municipal government and local industries, to facilitate enforcement of the design and installation regulation. However, rather than facilitating a flexible network of horizontal governance, the alliance between the municipal government and the local industries quickly became fossilized in terms of its operation. This arrangement constituted a mechanism for exclusion of other actors (such as construction companies) from decision-making within the solar sector.

The spread of wall-mounted SWHs followed the diffusion of water-in-glass evacuated tube SWHs in low-rise buildings. By the time the complex of local government and industry took action to promote wall-



mounted SWHs in the early 2000s, water-in-glass evacuated tube SWHs had already been popularized through a bottom-up process of experimentation (Huang, Ma, & Liu, 2018). In the 1980s and 1990s, firms such as Sangle and Himin in Shandong Province actively conducted entrepreneurial experiments to open up the niche market for SWH products in Rizhao (Huang, Ma, et al., 2018). These bottom-up experiments were initially driven by unmet social needs and were deeply rooted in contextual factors, such as a cultural base of ‘solar worship’ and a long tradition of utilization of solar energy and residents’ household practices of maintenance and repair (Huang, Ma, et al., 2018). Residents who later moved to high-rise buildings took with them their habits, including the use of SWHs, and were receptive to the new wall-mounted models. As mentioned by an interviewee, “that is ... a habit. The [residents] are not comfortable without SWHs” (Official, Rizhao, 2016.10.17). This dimension of solar energy adoption reflects the importance of culture and practice in technology adoption and diffusion. Ensuing political agendas are unlikely to have been successful without these original conditions, which underlines the role of place-based factors in local energy transitions.

#### 4.2.4. Vertical interaction (intergovernmental)

Our data demonstrates that Rizhao's solar success is interconnected with global discourses. In 2010, Rizhao Municipal Government extended the mandatory installation regulation of SWHs from low-rise and multi-floor residential buildings to high-rise buildings. This measure was related to maintaining previous achievements in SWH implementation, which was recognized as constitutive of the city's identity as a leader in renewable energy adoption. This is vividly reflected in a speech given by a governmental official in a meeting on the application of SWH systems in Rizhao (Rizhao Construction Committee, 2010):

*For many years, Rizhao leads in the application of SWH systems in buildings among Chinese cities, whose achievements have been widely lauded by the Ministry of Housing and Urban-Rural Development (MOHURD) as well as many foreign media. However, we need to notice that previously in Rizhao there were mainly multi-storey buildings, in which the installation rate of SWHs was relatively high, while recent years have seen the steady growth of high-rise buildings in Rizhao. Because we do not mandate the installation of SWHs in high-rise buildings, the majority of these newly-built high-rise buildings often do not install SWH systems. As a result, there is a tendency of decreasing application rate of solar thermal technology in buildings. If things continue this way, soon Rizhao will lose its leading position in the application of solar thermal technology (Governmental official, Rizhao, 2010.04.29).*

Here, the study of political interactions draws attention to the complex series of events explaining widespread popularization of this technology. In this case, a combination of cultural acceptance and entrepreneurial innovation led by local firms paved the ground for adoption of SWHs in low-rise residential buildings. At a later stage, adoption in high-rise buildings was formalized by local municipalities and supported by higher levels of government, as well as strategic alignment of political-economic particularistic interests. The role of international projections was to legitimize a transition that had already taken place. As above, successful governance occurred in spite of – rather than as a result of – multi-level cooperation.

### 5. Revisiting multi-level governance theory in the context of a semi-authoritarian political system

In-depth consideration of the dynamics involved in pursuing low carbon development in Rizhao illustrates how MLG dynamics have played out in practice in this mid-sized city in China. Three main observations regarding the applicability of the MLG approach in this political system derive from this analysis.

First, our investigation reveals scant evidence of the presence of network participation or international interconnectedness on the ground

in Rizhao. Global acknowledgement appears to have encouraged political commitment to the low-carbon mission, supported political gains, and enhanced investment opportunities. However, while local leaders have drawn legitimacy from global discourses, they have not demonstrated ability to leverage international networks to build alliances, access resources, or absorb best practices. In this study, Rizhao was selected as a ‘most likely’ case for the presence of such dynamics. The absence of such mechanisms in this city suggests that other ordinary (medium-sized, mid-range income) urban areas are even less likely to profit from such global interlinkages in their low carbon efforts.

The second insight relates to the powerful influence of coalitions of political and economic stakeholders over urban development trajectories. Actors representing the urban economy have a disproportionately large leverage over decision making, while the interests of other groups are systematically overlooked. As a result, low carbon policies are shaped alongside political decisions that allow for continuation of urban high carbon paths of growth (Khan, 2013). This implies that actors are most likely to succeed in advancing low carbon action when they align their strategies to economic development objectives (as with popularization of SWHs). Further, strategies of ‘horizontal collaboration’ take on radically different meanings from mainstream MLG research: in this setting they constitute barriers to action and a dimension that contributes to cementing status quo (as with the eco-city plan).

A third observation relates to the enduring power of traditional channels of authority. This case study was selected as a city representing leading-edge climate governance strategies in China. Yet, in terms of government activities, the politics behind adoption of SWHs in Rizhao demonstrates remarkable adherence to top-down strategies. The political determination of Shandong Provincial Government was a factor allowing for support of solar technology and the vertical transfer of political targets is a textbook example of traditional management strategies. When bottom-up processes of innovation emerged, higher level institutions engaged with forms of regulation to advance central policy in a manner directed towards the control of local innovation, rather than its promotion. However, the widespread adoption of solar technology was not an outcome of this top-down program. Rather, regional and municipal governments repackaged an ongoing local interest in solar water heating technologies to advance their own political interests.

Based on these results, we caution against the direct application of MLG theories to environmental politics in China. MLG ideas have become strongly associated with a set of normative ideals; the existence of vertical and horizontal interactions implies governance processes that are legitimate, deliberative, effective, and democratic. However, these benefits are unlikely to materialize within a semi-authoritarian political system. Semi-authoritarian, in this setting, refers to a political system that has gradually opened up to decentralization, where decision-making has diffused across a larger number of actors, and in which power has shifted away from the political core (c.f. Lieberthal, 1992). Nevertheless, authoritarian aspects remain, in terms of dominance of top-down command and non-democratic decision-making. Within China's one-party state and amid the dominance of technocratic arguments, the existence of collaboration and multiplicity of actors is not akin to greater social inclusion, deliberation, or political participation (Westman & Castán Broto, 2018). These interactions can be construed in terms of MLG only if we accept a deeply impoverished version of the concept.

Broader lessons can be extracted from the case of China to examine the theoretical and ethical challenges to MLG theories of climate change. From a theoretical perspective, our results suggest that there is a gap between the ideal of the MLG perspective and actual processes of environmental governance that take place on the ground. What we see in Rizhao is a low carbon transition unfolding in spite of a lack of MLG dynamics. The dominance of a local government-industrial complex, limited influence of international climate change organizations, and the inability of a decision-making system to establish cooperative governance mechanisms have not prevented the spread of eco-city ideas and solar water heating technologies. Instead, the case of Rizhao illustrates



how urban transitions are embedded within specific contexts in relation to power relations, urban infrastructure networks, and cultural practices associated with material artefacts (Bulkeley, Luque-Ayala & Silver, 2014b; Huang, Castán Broto, Liu, et al., 2018). Our critique of MLG perspectives is an attempt to explain how climate change is governed in different political contexts from the perspective of practical challenges on the ground.

This critique, however, also raises an ethical challenge that questions whether MLG theories constitute the most effective point of entry to understand the governance of low carbon transitions in China and elsewhere. This is associated with questions that our interviews failed to reflect upon: Who is benefiting and who is affected by low carbon policies? The MLG literature struggles to answer this kind of question because of the focus on processes of decision making, rather than whether outcomes are just. Future research will continue to explore how governance networks contribute to innovation and diffusion of climate practices and policy in China. This work, however, will need to reflect on the production of uneven urban environments and the question of whether climate change governance is achieved at the expense of people's wellbeing and the obliteration of alternative climate action imaginaries.

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None.

## Appendix A. Supplementary data

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